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cc:

Subject: DOH's comments on fish sampling

Hi all, here are DOH's comments on the proposed fish collection for Lake
Roosevelt.

A few issues to discuss with regard to fish tissue sampling for Lake
Roosevelt.
First issue is the selection of fish species. We feel rather strong about
being able to address both the Colville and Spokane Tribal concerns on the
inclusion of additional fish species. Rob Duff pointed out that the
Colville Tribe was very interested in kokanee at a recent forum on the
Columbia and Lake Roosevelt. Also at our previous meeting in Spokane, the
Spokane Tribal representatives indicated their concern over mountain
whitefish. We feel that both species be included in the list of fish to be
sampled and analyzed. The list of fish species would then include: rainbow
trout, largemouth suckers, walleye, kokanee, and mountain or lake whitefish.

Second point that need to be addressed in the sampling plan is whether or
not to analyze for all 209 PCB congeners in all samples. From our
perspective, unless there is a specific need to conduct this analysis for
ecological reasons, it is likely overkill and rather expensive. Currently,
toxicity values for PCBs are based on total PCBs which are often derived
from either the summing of Arochlors, homologs, or congeners. The least
expensive would be to analyze for Arochlors to determine total PCBs. While
we realize their may be a need for congener analysis for "fingerprinting",
it is likely that only a subset of the samples for full congener analysis be
needed for such an assessment. A approach similar to work Ecology and DOH
conducted on the Spokane/Long Lake assessment would likely fulfill both
ecological and human health data needs.

Third point is on sample size. Attached is an excel spreadsheet that we
used to calculate sample size for various fish species based on work done by
Jim VanDerslice. We ran some calculations for both sample size estimates
based on PCBs and on mercury. Two options are given for both contaminants.
Ultimately selection of a sample size would be based on which contaminant
required the greatest number of samples. The first option for each
contaminant is pie in the sky. The more realistic sampling size in terms
of being able to collect and to pay for analysis is seen in option #2 for
each contaminant. It should be pointed out that with the reduction in the
number of fish, the ability to say something with any certainty diminishes.

To determine an appropriate sample size required having a mean and standard
deviation for a specific fish species. In most cases we had to estimate
both of these values which further diminishes the strength of the sample
estimates, but you go with what you've got. Given the means, we estimated
the meal limits. We then said ok, given these meal limits, how many samples

do we need to ensure that we don't have to change our recommendations to the next lower meal limit (EPA guidelines recommend establishing meal limits of 0, 1, 2, 4, 8, & 16 meals per month). We then calculated the fish tissue concentration that would put us at the next lower meal limit. Our sample size is then based on being able to determine with a power of 0.9, and a significance of 0.1 the sample size required to differentiate between the two concentrations (and therefore meal limits).

The second option differs from the first in that instead of dropping to the next meal limit category (e.g. from 16 meals per month to 8 meals per month) we went to jumping two meal limit categories (i.e. from 16 to 4). Given the greater difference in meal limits (and therefore fish tissue concentrations) the sample size required to detect such a difference given the same power and significance levels is lower. It should be pointed out that for both PCBs and mercury, option 2 resulted in the same number of samples (550 total samples).

In short, DOH would recommend that the number of fish species sampled be increased from 3 to 5. PCB analysis for congeners should be limited to a subset of the samples with the majority being analyzed for Arochlors to determine total PCBs, and that the sample size be based on the ability to differentiate between allowable meal limits as discussed above.

Dave

Lake Roosevelt sample size calculations for discuss

updated 1/6/05 based on limited data on total PCB levels in selected fish species

| Species | Size | PCBs | | 8 oz meals/month | Recom. | sampling | |
		Mean	Std dev	Mean	ML	objective	
Rainbow Trout*	All	40	22	4.0	4	mean >=	3
Walleye*	All	90	45	1.8	2	mean >=	1.5
Largemouth Sucker**	All	112.4	40	1.4	1	mean >=	0.5
Mt. Whitefish*	All	60	30	2.7	2	mean >=	1.5
Kokanee*	All	54.6	25	2.9	2	mean >=	1.5

Parameters
CV of replicates   0.25
Significance   0.1
Power   0.9

* estimates based on 1998 data
** Ecology 2002 Long Lake/Spokane River data

To Show:	Mean PCB conc. (ppb) at stated meal freq	MDD	# of pops in lake	analysis CV	var of obs	n	# fish per comp
if we can stay at 4	53.5	13.5	11	0.25	484.0	1	5
if we can stay at 2	107.0	17.0	11	0.25	2025.0	1	5
if we can stay at 1	321.0	208.6	11	0.25	1600.0	1	5
if we can stay at 2	107.0	47.0	11	0.25	900.0	1	5
if we can stay at 2	107.0	52.4	11	0.25	625.0	1	5

Est # Composites	# comp	# total fish	MDD	MMD ML low	MMD ML high	total fish
8.4	9	45	13.1	2.4	4.0	495
22.0	23	115	16.6	1.3	1.8	1265
1.0	2	10	145.0	0.3	0.9	110
2.6	3	15	43.8	1.1	2.5	165
1.6	3	15	38.4	1.1	2.3	165

Total fish   2200

updated 1/6/05 based on EIM data on statewide mercury levels in selected fish species

| Species | Size | PCBs | | 8 oz meals/month | Recom. | sampling | |
		Mean	Std dev	Mean	ML	objective	
Rainbow Trout*	All	40	22	4.0	4	mean <=	1.5
Walleye*	All	90	45	1.8	2	mean <=	0.5
Largemouth Sucker**	All	112.4	40	1.4	1	mean <=	0.5
Mt. Whitefish*	All	60	30	2.7	2	mean <=	0.5
Kokanee*	All	54.6	25	2.9	2	mean <=	0.5

Parameters
CV of replicates   0.25
Significance   0.1
Power   0.9

* estimates based on 1998 data
** Ecology 2002 Long Lake/Spokane River data

To Show:	Mean PCB conc. (ppb) at stated meal freq	MDD	# of pops in lake	analysis CV	var of obs	n	# fish per comp
if we need to go to 1	107.0	67.0	11	0.25	484.0	1	5
if we need to go to 0	321.0	231.0	11	0.25	2025.0	1	5
if we need to go to 0	321.0	208.6	11	0.25	1600.0	1	5
if we need to go to 0	321.0	261.0	11	0.25	900.0	1	5
if we need to go to 0	321.0	266.4	11	0.25	625.0	1	5

Est # Composites	# comp	# total fish	MDD	MMD ML low	MMD ML high	total fish
1.7	2	10	61.1	1.0	3.5	110
0.6	2	10	131.4	0.4	0.8	110
1.0	2	10	145.0	0.3	0.9	110
0.2	2	10	87.6	0.4	0.7	110
0.2	2	10	76.8	0.4	0.7	110

Total fish   550

updated 1/6/05 based on EIM data on statewide mercury levels in selected fish species

| Species | Size | Hg | | 8 oz meals/month | Recom. | sampling | |
		Mean	Std dev	Mean	ML	objective	
rainbow trout	All	50	27	16.1	16	mean >=	12
Walleye	All	187	104	4.3	4	mean >=	3
Largemouth Sucker*	All	146	55	5.5	4	mean >=	3
Whitefish**	All	97	25	8.3	8	mean >=	6
Kokanee	All	118	36	6.8	8	mean >=	6

Parameters
CV of replicates   0.25
Significance   0.1
Power   0.9

* whole longnose sucker used as surogate
** lake whitefish used

To Show:	Mean Hg conc. (ppb) at stated meal freq	MDD	# of pops in lake	analysis CV	var of obs	n	# fish per comp
if we can stay at 16	66.9	16.9	11	0.25	729.0	1	5
if we can stay at 4	267.5	80.5	11	0.25	10816.0	1	5
if we can stay at 4	267.5	121.5	11	0.25	3025.0	1	5
if we can stay at 8	133.8	36.8	11	0.25	625.0	1	5
if we can stay at 8	133.8	15.8	11	0.25	1296.0	1	5

Est # Composites	# comp	# total fish	MDD	MMD ML low	MMD ML high	total fish
8.3	9	45	16.2	1.9	3.2	495
5.8	6	30	79.5	0.5	0.9	330
1.9	3	15	95.8	0.4	0.9	165
5.0	5	25	36.6	0.9	1.7	275
31.2	32	160	15.6	1.1	1.4	1760

| | | | | | total fish | 3025 |